August 1985

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A&

REGULARS

FEATURES

B

Eight August 1985

Next Month

Creative Sound

```
%6I4E7I2CCCC
6I4E7I2CCCC
6I4E7I2CCCCR
%6I4E7I2CCCCR
6I4E8/.
1222 Bytes, 80 Bars

Top of data: &49F9

Press SPACE BAR to begin
```

The music compiler working its way through MCL data.

Creative Sound by Hybrid Technology's Chris Jordan and Music/Micro correspondent David Ellis is the latest in a long line of interesting musical releases for the BBC Microcomputer in the last 6 months.

In the book and book/disc/ cassette package, we get the synthesis of Chris Jordan's expertise with the BBC (he designed the SOUND and ENVELOPE statements for the BBC and Hybrid produce the Music 500) and the writing and musical skills of David Ellis, well known for his columns in the music and computer press.

The style is chatty and humourous which helps break up the technical aspects. Some of the content is fairly demanding of the reader, especially without previous contact with either the music or microcomputer world.

If you want to know about the antecedants to the current technology, you will find an enthusiastic history at the start of Creative Sound. And if you want to catch up on the latest in synthesiser/microcomputer combinations and the quite close links between the two, then the authors are just the people to keep you up to date.

Creative Sound is based on the BBC Microcomputer and the book is packed with listings, ranging from one line of SOUND statement to eight pages of synthesiser, or music compiler. The authors do well to avoid the constant repeats of the User Guide on SOUND and ENVELOPE but satisfy our curiosity with constructive examples. There is as much to see on screen in the way of Fourier synthesis and SOUND and ENVELOPE demonstrations (very nicely programmed and presented) as there

Fourier Synthesis plotting away.

is music to listen to. The text has plenty of diagrams and screen shots and information on program use.

The authors' interest in music rather than noise is demonstrated by a very short acknowledgement of games noises and sound effects. From there it's on to real time music, a mini studio for record, edit and playback, a preset, programmable and echo synthesiser and a programmable sequencer.

The two main chapters of interest to already accomplished micro musicians will be those on composing by computer and composing with the assistance of the computer. Mozart's musical dice game with which he composed waltzes is reproduced for the micro. It makes fascinating listening and is followed by investigations into minor chords and fractal tune generation. Composing by statistics

always seems a bit cold and the authors appropriately fill in the academic background to work in this field. You'll be delighted to know that this chapter closes with a program for composing coloured music and the self-fulfilling Muse.

The computer assisted composition revolves around the idea of a MCL (Music Composition Language). From an earlier music interpreter and forays into Canons and Phase Music (which necessitates some complex reconfiguring of the O.S. sound software), emerges a music compiler. An easy to use combination of keyboard characters form the composition codes (AMPLE programmers will be on familiar ground) which are compiled into an efficient (two byte per note) intermediate code for interpretation and playing.

The music, original or copied from sheet music, is entered into DATA statements and can easily be "EXECed onto the end of the main program. Various examples are provided, from Bach to the ear piercing Continuum by contemporary Hungarian composer, Gyorgi Ligeti. The compiler is not just a digital jukebox however. It forms with the rest of the programs in Creative Sound a formidable musical toolbox for the experimenter. The programming is to a high standard in its own right and not just throwaway illustration of the text content.

The authors finish off Creative
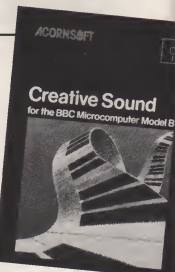
Sound with the least creative section but nevertheless a useful look at musical education software aids. Taking their cue once again from the superpower examples from America, the authors produce some humble BASIC listings for pitch training, pitch tuning, interval drill, keyspinner (minor or major keys?), key confuser, scale recognition and rhythm drill. All should prove useful to the teacher of music or the individual inspired to gain some conventional music skills at the same time as working on his first AMPLE concerto!

For anyone already bitten by the music bug Creative Sound is essential reading and programming. For anyone teetering on the brink, £9.95 is not a lot to pay for a good informative read, some valuable programs and music to show off with! If you enjoy the luxury of being more into music than programming then the £17.95 (book plus cassette) or £19.95 (book plus discs) is a worthwhile investment, just so that you can get your hands on the working programs that much quicker.

An early pioneer of computer music, Max Mathews, is quoted in Creative Sound: "Computers will add a new dimension to music especially the home computer. It will be sufficiently easier to play that many people who otherwise could only listen to music will become active musicians. This may be the biggest accomplishment of the home computer market." Dave Ellis and Chris Jordan are doing their bit to make this prediction come true.

TIME DOMAIN

FREQUENCY DOMAIN

AMP:
NUM:

1   10   20   30
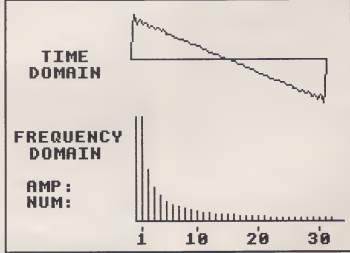
BBC Road Safety

Des Thomas

Road Safety and the Micro.

"Our children have much to fear from man's inventiveness, for such is the pace of modern technological development that they have constantly to adapt to new situations at home, at school and, most of all on the roads, where they are subjected to more and greater risks than ever before. In modern society the traffic accident has replaced malnutrition and disease as the biggest single threat to young life and limb.... What makes this continuous waste of human life even more shocking is that so many road tragedies could be prevented. Analysis reveals that human error is a major factor in almost every accident and while engineering improvements in car and road design help to ensure that such errors become less likely to lead to accident and injury, it is education which offers the surest method of reducing the incidence of errors themselves."

"Children and Traffic — Road Safety Education Project", MacMillan Education.

The Road Signs Project

Des Margesson
Laurien Clarke

RML 480Z
cassette

If you've stood outside a school at the end of the afternoon session, you might question the last statement. Forget the children for a moment and look at the adults who have all been through the system — the ice cream vendor parked as near as he can to the school entrance; parents gossiping and blocking the pavement with prams so that the children have to step into the road to pass; the toddlers playing in the gutter; the double parking; parents throwing open the rear offside door and beckoning to the infant poised on the opposite kerb or turning their cars in the school gateway and waiting in the area clearly marked SCHOOL ENTRANCE for a quick getaway.

What about the planners who designed the school with only one entrance/exit for use by cars, delivery lorries and children; and, of course, there are the children themselves! Not unnaturally, the most commonly used teaching method is teaching by example, but it's obvious from the above — and I don't think that the area outside my school gates is any better or worse than any other — we set our youngsters a very poor example.

Road Safety is a subject often brought up in assemblies, some schools incorporate it into some of their topic work and a large number, often in co-operation with a small band of willing parents and/ or the Road Safety Officer, run a Cycling Proficiency Course sometime during the year. As we started to set up our course this year, I decided to look around to see if there were any computer programs available which might help — after all aircraft/space pilots are not asked to risk life and limb or expensive craft until they've spent some time on a simulator. Indeed, I was pleasantly surprised, not only by the amount of software available to support road safety projects in general but also at the quality of it, and I don't suppose for a minute I've found it all.

CYCLING PROFICIENCY

Since my search started with programs for the Cycling Proficiency Course, let me begin by taking a look at two sets of programs specifically designed to help with that.

The *Road Safety Programs* are designed to illustrate graphically the tasks given by Road Safety Officers/teachers as part of the Cycling Proficiency Scheme (or by teachers doing a project on road safety), ie they are intended to be used as an electronic blackboard. The quality of the graphics is such that they serve their purpose extremely well, and will certainly brighten up any presentation.

The programs can be briefly described as follows: *The Bicycle* draws all the major components of a bicycle in a logical sequence to build a complete bicycle. Two options are available: a) a fully automatic drawing, and b) a step by step drawing, each step easily controlled by the user, with no time limit. A version of the BMX bicycle
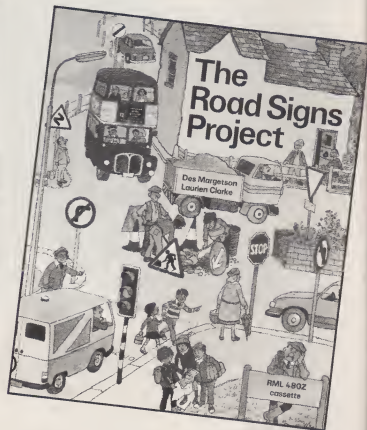
is also included. *Traffic Lights* depicts a road-user's view of a set of traffic lights. The sequence of lights, and their interpretation, is again controlled by pressing the Space Bar. Options include the facility to suppress text until required, addition of an independent filter arrow and addition of a fixed sign, ie turn left only.

Pelican Crossing: first option allows the user to select pedestrian's or road user's view of Pelican crossing lights, with a representation of the lights as seen by the other, and sound when appropriate. Further options include a fully automatic sequence and a manual sequence controlled by the user.*Road Signs* includes two sets of main road sign configurations. The first set includes four examples of the warning, mandatory, prohibitive and information signs many of which have particular relevance to cyclists, while the second set gives 11 further examples from the first three groups.

The second set, entitled *Bike*

covers three turning manoeuvres the cyclist is expected to know: turning right from minor road to major road, turning left from minor road to major road, and turning left from major road to minor road. The programs may be used in three ways:

Demonstration is a graphic demonstration of the manoeuvre, requiring no further keyboard operation once the option has been chosen. Each action taken by the cyclist is described at the bottom of the screen.

Order of Events: the actions required to carry out a manoeuvre are displayed in random order on the screen. When all the actions have been placed in the correct order, the cyclist will carry out the manoeuvre. If an event is not in its correct position, the cyclist performs the manoeuvre until it reaches the incorrect event and the user then has to correct the error.

User Move: the cyclist can be guided through the manoeuvre on

Figure 1 Topic Web

The Bicycle
Press SPACE BAR to start again

Loose chippings
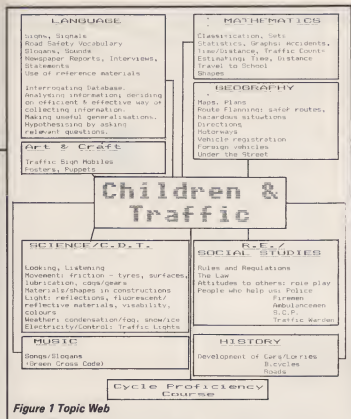
Figure 2 & 3 Screen dumps of Bicycle and Road Sign from The Road Safety Programs.

Figure 4 A workcard from Bike

the screen using the function keys. Beware of traffic!

The programs are accompanied by a set of 14 workcards designed to give a structured development to the pupils knowledge of using the road, directions, signals, posi-

tioning, junctions and signs, and vocabulary. Having seen the first set of programs, most users will be disappointed in the quality of the graphics and lack of colour. They left me looking forward to the interactive video. Nevertheless,

they serve their purpose, even if they do so with little panache.

ROAD SAFETY PROJECTS

The Humberside Road Safety Project contains two programs in

which the emphasis is on problem solving and forming appropriate strategies in the context of road safety. In the first program, To School Carefully, which is intended for the 7+ age group, the object is to plan as carefully as pos-

35

To finish press F.
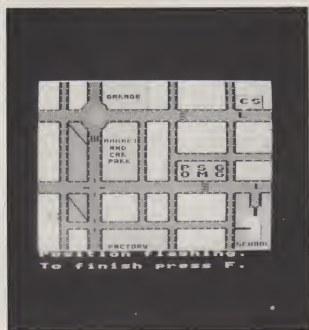
TO SCHOOL CAREFULLY — PUPILS' WORKSHEET

Name of group: .... Level: ....

	What you need to know	√ your 'run'
LEVELS 1, 2 and 3		DAY:
	On Monday it is delivery day at the factory There are lots of heavy lorries around Try not to walk near the factory	MONDAY
	On Tuesday it is market day There are lots of cars using the car park. Try to walk near the market	TUESDAY
		WEDNESDAY
	On Thursday it is factory delivery day	THURSDAY
	On Friday it is market day	FRIDAY
		WEATHER:
	On wet days, the footpaths across the churchyard and the park are very muddy	WET
	You should not use them	DRY

		CALL AT:
LEVELS 2 and 3	Your friend's house is F on the computer map	Friend's house
	Your auntie's house is A on the computer map	Auntie's house
	You post letters inside the post office	Post Office
	The supermarket sells fruit and drinks	Supermarket
	The greengrocer sells only fruit and vegetables	Greengrocer
	The corner shop sells drinks but not fruit	Corner shop

LEVEL 1
Mark your route on your map sheet Mark your route

LEVELS 2 and 3
Mark any places where you need to call on your map sheet. Mark your route

LEVEL 3
Did anything happen on your way to school to make you change your plans? If so, mark it on your map

REMEMBER
If you cross the road outside your home, your mum or dad will see you safely across
Look for safe places to cross, and ALWAYS use the GREEN CROSS CODE

Figure 5 Screen Map and worksheet from To School Carefully

PUPILS WORKSHEET — MAKE IT SAFE

On this map you should mark
1. Primary school, Old Peoples Home, Secondary school
2. Main Road
3. Regions 1 to 6
4. Existing signs and signals
5. Items you have added or removed
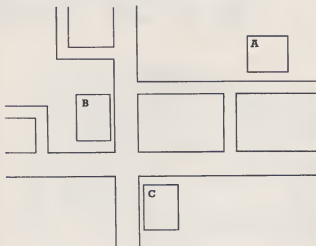
Your budget is 20 points only
Traffic Lights	cost	4 points
Pelican Crossings	cost	3 points
Zebra Crossings	cost	2 points
Stop Sign	costs	1 point
Give Way Sign	costs	1 point
Removing an item	costs	1 point

Choose:
1. Stop
2. Give way
3. Pelican
4. Zebra
5. Traffic lights
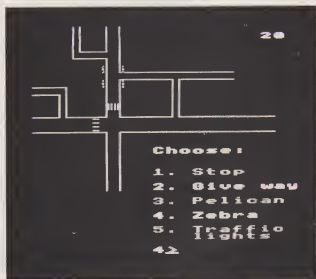
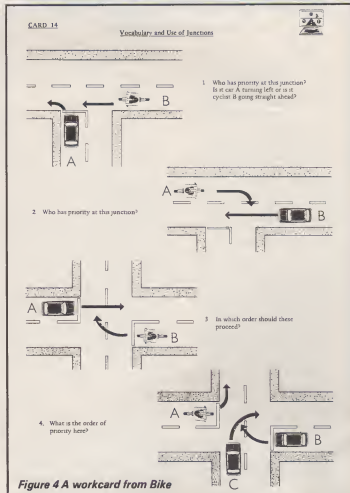*Figure 6 Map and Worksheet from Make It Safe*

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sible a route from home to school. A map of an urban setting, comprising a typical grid system of roads with main and side roads, is presented. On certain days parts of the town are particulary busy and care must be taken to avoid these areas.

The program has three levels of difficulty, which determine the number of variables the children have to manage. For the first two levels, all the relevant information is provided before the journey is undertaken, but at level three, unplanned for contingencies may occur which involve 'on the spot' decisions concerning a revision of

the chosen route. If the user group (it's considered best to use the programs in a group as the discussion generated is valuable in the decision making process and the development of communication skills) tries to cross a road without remembering the Green Cross Code or at a dangerous place then a message appears on the screen.

When the group has arrived safely at school, a screen-presented evaluation of the performance is available.

Make It Safe — intended for the 9+ age group — requires the group to consider the placement of road furniture to improve the accident statistics within a series of regions on an estate, thus making

Figure 7 Map for Program 5

Name _____

Date _____
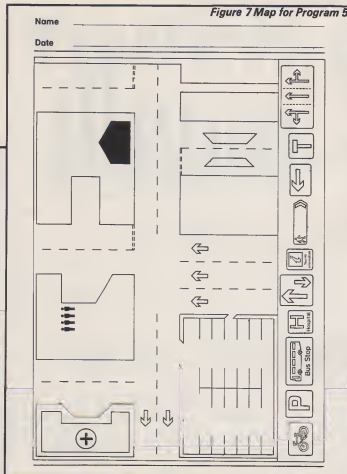
Figure 8 Map for Program 6
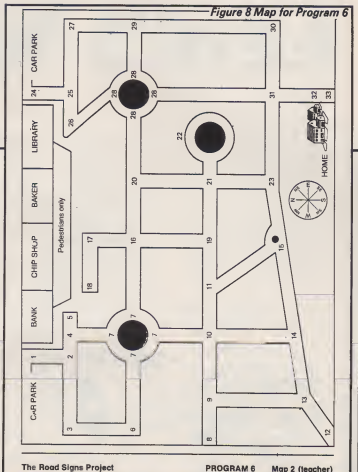
The Road Signs Project   PROGRAM 6   Map 2 (teacher)

a housing estate a safer place to live. A map of an imagined housing estate is provided, complete with some road furniture. The accident statistics for six pre-chosen regions are shown on the screen. These depend on the placing of two schools and an old peoples' home.

The group discuss what improvements are to be made within the budget allowed (shown by the number of points rather than money) and they have the opportunity to alter the situation, taking into account the nature of the road concerned. Graphic representations of the furniture can be moved to any position on the map and, if inappropriately placed, a message will be displayed giving a chance to reconsider the position chosen. Will the accident statistics be improved by the alterations made? The Road Safety Computer predicts changes in the number of accidents based on the decisions made.

Decision making and problem solving are key words associated with software distributed by Fernleaf and, I must admit, I like their general approach to the use of computers with children. These programs are no exception to this, and I'm sure will be a very welcome addition to any project involving

road safety. I particularly liked the latter program — I'm sure many children could teach the so-called experts a thing or two! I'd like to see a utility program which would enable the users to develop their own screen map — maybe of their own locality — within this program. Teachers wishing to follow up the idea of route planning/giving directions should consider *Town* (reviewed in A&B April 85), which will allow them to plan their own road network, eg the area around the school.

*The Road Signs Project* is a suite of eight programs based on a familiar feature of everyday life — road signs (what else!). The primary aim of the project is not for children simply to learn the meanings of the signs, but for the road signs to be used as a basis for other learning experiences. The programs are accompanied by a comprehensive Teacher's Guide and a very useful set of 48 black line masters provides various exercises, route maps and graded activities, which are closely linked with the programs.

Program 1 deals with the recognition of a small number of road signs and helps to develop an understanding of the connection between signs and meanings. In part one, the "easy" ones, the user

has to type in the meaning of the signs, while in part two, there are some answers to choose from. Program 4 deals with Order and Warning signs and asks questions about each of them, while in Program 5 introduces information signs and stresses the positive side of the system which controls traffic movement. The user is shown a town map in full — a printed copy of this is available in the pack — then only a small piece. One of the ten information signs available at the bottom of the screen has to be placed in position. At the end, a circle is drawn around the ones that are wrong. Unfortunately, there's no opportunity for a change of mind!

Programs 2 and 3 deal with traffic lights. The first section of program 2 asks the child to identify the traffic lights as displayed on the screen — colour recognition, associating colour with meaning and identifying correct sequence, while the second part involves prediction — which pattern will the lights show next? Program 3 puts the information practised in the previous program into context, the user having to drive a car around a road circuit involving traffic lights for three minutes. There is a speed option, which is useful for the younger children or those whose co-ordination and reaction is slow

— ask a few adults to try!

Program 6 co-ordinates the previous programs by presenting a screen map incorporating several of the signs already encountered, introduces directional signs and uses road signs in conjunction with travel. Users have to plan routes from home to the shops. The emphasis changes in program 7 from interpreting road signs to using the road network and concentrates on direction finding. Two activities are suggested: find the route (quickest?) from Startown to Whitbeach or explore the blank parts of the map (again provided in the pack) and fill them in. The graphics, which depict the scene with the directional signs that the driver would see when approaching a junction or bend are very effective, as in the other programs.

The last program is a demonstration of all the major road signs used in the other programs. The Teacher's Guide gives information on ways in which these can be incorporated into other programs — a very thoughtful touch for those wanting to try their hand at writing programs.

This is a very comprehensive package. It has been well structured and so provides activities to support a project with children of a

CONTINUED OVER

Figure 9 A Worksheet for Program 7

Name

Date   Level 2/3

1 Find 4 different ways to travel to Whitbeach.

2 When is the best time to visit the seaside?
   Give the reasons for your choice

3 Describe 4 different ways to get to Drypool
   and back to Startown.

4 What kind of outings do you like best?

5 Write about or draw a picture of an outing
   you enjoyed.

6 Write about or draw a picture of an outing
   you disliked.

7 Make up a treasure trail. Write about the
   things you have hidden in different places.

8 Plan an imaginary outing to one of the places
   marked on your map.

9 Take a chance and visit Warrenend.
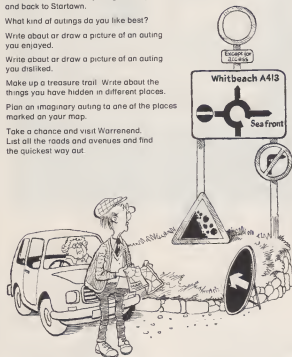   List all the roads and avenues and find
   the quickest way out

Figure 10 A PICFILE Graph from the ROSPA datafile

wide age/ability range. There were
one or two niggles, where I thought
the programmers could have been
more friendly — the BREAK key
taking the user right out of the pro-
gram, not back to the MENU as
one might hope in a suite of pro-
grams, and in Program 6, where
"Route ends — Goodbye" leaves
one up a cul-de-sac and the pro-
gram has to be reloaded — but
they were only niggles in an other-
wise first class production.

STATISTICS AND
MORE...

What about all those statistics that
are collected about accidents?
These can provide a vast amount of information to cre-
ate datafiles. I'm sure your Road
Safety Officer will be able to let you
have a printout of the latest acci-
dent figures for your area so that
the children can make their own
files, using a database suitable for
their age, ability and experience.
   If in doubt about how to go
about it, it'll be worth having a look
at ROSPA's Accident Datafile,

which contains records of 66
actual accidents to children in the
5 — 14 age group, and is designed
to be used in conjunction with
Factfile (every school has a copy of
this!).
   Those who wish to be more
adventurous may like to explore
Investigator, which is a dedicated
database developed by ITMA and
the Devon Traffic Unit. This allows
more complex enquiries to be
made on Devon road accident
records for 1983. Teachers with a
small amount of programming
knowledge should be able to adapt
this program to work with their
own data if they want to use more
Fieldnames (Headings) than avail-
able in Factfile, but feel they, or
their youngsters, are not ready to
move on to one of the more
sophisticated database systems.

HAVE SOME
FUN!

Children will find it enjoyable
working with most of the programs
mentioned above, and although
this is a very serious subject, a "fun
approach" can often be very effec-
tive. For young children, many of

whom will be taken to school by
mum, dad or older brother/sister,
there's that delightful little pro-
gram, Roadcraft 1, which was
reviewed in the Edsoft pages of
A&B in November 84. Roger
Roadcraft has to be taken across
three roads. The program offers
five skill levels — the higher the skill
level the slower Roger crosses the
road and the greater the volume of
traffic. Zebra and Pelican cross-
ings, policemen and crossing
patrols offer a variety of methods
of crossing the roads safely. The
graphics are pleasing and it is "fun"
— and what if you kill off Roger a
couple of times; at least he'll come
back to life for a rerun!
   If you really feel like allowing the
children to let their hair down, try
to get hold of a copy of Midtown,
which was produced by the Tele-
soft Project at Brighton Polytech-
nic for CEEFAX. In this program
the operators have to find the fas-
test and cheapest route in a town
to direct a car from A to B. There
are one way streets, other traffic
and a ring road, where the traffic
moves a lot faster. The program
checks the time, the amount of
petrol used and the cost of repairs!
Who's the best driver in your estab-
lishment?
   I began with a quotation from
"Children and Traffic". Let me end
with another from the same series
of books: "Accident prevention is a
method of equipping children for
independence by creating within
them a "safety consciousness"
which will guide their behaviour in
all circumstances, enabling them
to identify and assess hazardous
situations properly, to calculate risk
responsibly and to widen the scope
of their activities accordingly".
   Using the micro can pay an
important part in this training —
but only a part. Most of the pro-
grams mentioned in this article
make excellent use of the micro.
I've deliberately not set out to pro-
vide a "best buy". While some of
the programs have "overlap", they
mostly fulfill different purposes.
Hopefully, I've provided sufficient

information for you to decide
which is/are most suitable for your
project. At least none of them set a
bad example, so they might prove
useful with those thoughtless
adults!

PROGRAM
INFORMATION

The Road Safety Programs,
David Seume, c/o Surrey CC,
Road Safety Section, Highway
House, 21 Chessington Road,
West Ewell, Epsom, Surrey
KT17 1TT, £14.50 (disc).

Bike, Clwyd Technics, Ante-
lope Industrial Estate, Rhy-
dymwyn, Mold, Clwyd £17.50
+ p&p).

Road Safety Project, Fernleaf
Educational Software, Fern-
leaf House, 31, Old Road
West, Gravesend, Kent DA11
0LH, £18.95 (disc or cas-
sette), £10.95 (individual pro-
grams).

Town, Cambridgeshire Soft-
ware House, The Town Hall,
St Ives, Huntingdon, Cambs
PE17 4AL, £13.00 +£1.00
(p&p).

The Road Signs Project, Ward
Lock Educational, 47, Maryle-
bone Lane, London W1M
6AX, £29.95 (disc or cas-
sette).

Investigator, Longmans Micro
Software, 33-35, Tanner Row,
York £10.95 (disc).
Accident Datafile, ROSPA,
Cannon House, The Priory,
Queensway, Birmingham B4
6B3, £5.00.

Picfile (includes enhanced
Cambridge Micro Software,
version of Factfile) Cam-
bridge University Press, The
Edinburgh Building, Shaftes-
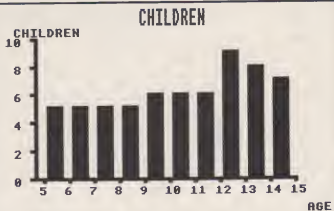bury Avenue, Cambridge.

Down to Business

Jon Vogler

Upgrade your BBC Micro to an IBM PC.

The Graduate is the ultimate in "add-on" hardware. It will convert your BBC Micro into the nearest one can get to an IBM PC (Personal Computer) without infringing the IBM copyright. "Why do I want an IBM PC?" you may ask. The answer is very simple: there is more good business software available for the IBM PC than for any other personal computer including: concurrent (holds several programs in memory at the same time), multi-tasking (does more than one activity at the same time) and windowing (presents more than one activity on the screen at one time) operating systems, and such trendy business packages as Symphony, Framework, Lotus 1-2-3, Perfect II, and DBASE III.

Acorn, Torch (who make the Graduate) and Upgrade all offer Z80 add-ons to run the "CP/M" operating system but this can have only 64K of memory, which cannot be increased. With an IPM PC or a "PC compatible" computer you can have up to 640K of memory.

NOTE FOR THE TECHNICALLY MINDED
Z80 memory is limited to 64K, because it is an 8-bit processor with a 16-bit "address bus", giving 16 address channels which can address 216 or just over 64,000 different memory addresses. The IBM PC on the other hand uses a 16-bit processor, the 8088, which uses a 20-bit address bus to address up to 220 or just over a million memory addresses. IBM, however, do not physically provide that many.

There are other powerful upgrades around: Torch also make the Unicorn, a "third processor" of enormous power (which this column will review shortly) which can have up to a megabyte of memory, but (and I apologise to

readers for the error on page 73 of the March issue which said it could) it cannot run the "MS-DOS" operating system. This is the widely available equivalent to "PC-DOS", which only the IBM PC uses and, at present, is the first choice of operating system for the best business software.

The Graduate has an 8088 processor, runs MS-DOS and has 256K of memory plus two "hardware expansion slots" so you can add memory until you have the full 640K: that is about three hundred pages of closely typed A4 text or the entire accounts for a fair sized company for a whole year! It can run virtually any program needed by the serious business user. I used it with Lotus 1-2-3; Wordstar and with the elegant new Perfect Software II (greatly improved and friendlier version of the software that is bundled with the Torch Z80) currently only available for the PC, but is, of course, used it with the Psion Xchange suite of integrated software, that is bundled with the Graduate and which is discussed below.

GRADUATE AND THE IBM PC

The Graduate is not a PC and those who buy it will want to know what shortfall they can expect. There are three main limitations.

Firstly, the modest restrictions imposed by using a BBC keyboard are overcome, by combinations of Shift and Control with character keys, and cause little problem.

Secondly, the BBC Micro provides only black and white in 80-column screen mode: far short of the IBM PC's impressive 16 colours. Even though one can only use four of the sixteen on the screen at one time). This means that it is virtually useless to use business programs on a colour screen. This has not been a worry in the past and I maintain that colour is not appropriate to concentrated use, many hours a day, but times are changing. Colour screens have become better and

some of the best business software is now using selective colour. In graphics and 40 column text modes, the Graduate has normal BBC colours available.

Thirdly, and slightly more serious are limitations of the graphics. For more complex reasons (for explanation see separate box) the Graduate does not perform cer-

1 Graduate and Xchange software

NOTE FOR THE TECHNICALLY MINDED

The 6845 "video-generator" chip in the BBC Micro still runs the screen. The IBM PC also uses a 6845, so what is the problem? Strangely, it is to do with the superb screen performance of the BBC. The 6845 chip uses no less than eighteen "internal registers" (fast, tiny memories actually inside the processor itself) which, in modes 1 to 6, save the user the trouble of handling most screen functions.

To further help the user, he or she is not expected to know which register to use: there is one single "post box" provided in the computer's main memory. Into it you post each instruction (which, like any letter, must bear both the message or instruction and the address.)

Now we come to the problem: the "post box" is in the BBC's memory, not in the Graduate's. Some PC programs, such as Flight Simulator, work very closely and rapidly between the 8088 central processor, its main memory and the screen, to achieve complex, exciting, rapidly changing graphics. But with a BBC/Graduate combination, the 8088 looks for the post box in its own memory and finds none there. Think of a centre-forward, trying to create a fast attack along the axis of the game. He swaps the ball rapidly with his inside forwards, always keeping the opposition on the wrong foot. But once his insides are not there in support he is foiled: to try and do the same with a winger or centre-half would slow the assault and lose its dynamic effect. The 8088 has not been taught to look for a screen post box in the BBC and, even if the program was rewritten to do this, the speed of that intimate screen/processor combination would have been lost.

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tain kinds of graphic programs, such as the famous Microsoft *Flight Simulator*, in the same way as the PC does. So do not buy a Graduate if you want to run this kind of software.

HARDWARE

Graduate comes as a six-inch deep box, ten inches wide and sixteen inches from front to back, in the front of which are mounted dual disc drives. It is made of steel and pleasantly finished in two-tone grey. Remove the top cover (an easy task) and you will see: the two Cannon disc drives, each with a capacity of 320 KBytes after formatting (production models use Epson drives, which Torch say are quieter); a power supply and cooling fan; a single, large printed circuit board on which are mounted the 8088 processor, an impressive army of RAM chips and the two welcoming expansion slots.

The good feature is that the unit will operate on one side, with the disc drives vertical. Although it looks rather silly, with its four rubber feet waving in the air, this is a most convenient arrangement as the 32-way ribbon cable that connects it to the "1MHz bus" connector underneath the BBC's keyboard, is lamentably short. The alternative would be to have the Graduate sit at the right hand side of the BBC and there would be ample space on it for a modem or document holder. The BBC needs no internal ROM (permanent memory chip) fitting, so connecting the Graduate to the Beeb is a matter of a few seconds: insert the ribbon cable and plug the Graduate into the mains. Switch on, and it "boots" (loads, automatically) MS-DOS from the "system disc". Now you are ready to load any application program. I have been used to a Z80, with the operating system held on a ROM, and found it rather tedious to have to load MS-DOS every time I switched on, but users will soon develop their own procedures.

MS-DOS uses a "batch-file" technique. You write a simple list of commands, which you save as a special file on your system disc. This can contain instructions to change screen colours, switch on the printer, load the applications

program and select the correct disc drive for the program files. It can be automatically executed when you boot MS-DOS.

THE BBC AND THE GRADUATE

How does the combination feel to the BBC user? The first thing I noticed was that my screen had lost seven whole lines! Now it only has 25 and I miss the extra seven, for reasons explained below.

On the review model the screen scrolled, rather jerkily (due to the screen memory all being held in the Graduate box and having to come across the 1MHz bus) but I soon found I could ignore this and Torch tell me it has been corrected on current production models. More frustrating was the loss of the BBC's split cursor, with which you can COPY lines higher up the screen. With MS-DOS, various function keys have been trained to copy previous instructions, but it seemed much less easy.

I also felt cheated that I could

2 Inside the Graduate. Clearly visible are: floppy disc drives, front left; power supply and fan, rear left; 256K memory, front right; IBM expansion slots, rear right.

only store 320 KBytes on two sides of a standard 5 1/4" floppy, instead of over 400 with the BBC's DFS (and 800 if you use double-density).

On the credit side, MS-DOS is a much wider and more powerful operating system than the Beeb's MOS. Just to give one example,

you can "pipe" the results of one program back into another program, without having it appear on the screen at all. I used this on the catalogues (called "directories" in MS-DOS), so as to arrange the files in a convenient alphabetical order. This overcomes the "hunt-the-file" problem that bedevils any user with more than half a dozen discs full.

XCHANGE SOFTWARE

Whatever the virtues or vices of MS-DOS, Torch have chosen well to offer the Graduate with Psion's integrated software suite. It comprises four modules: word-processor *Quill*, spreadsheet *Abacus*, database *Archive* and a sublime business graphics program, *Easel*. No less than seven files, in any combination of these, can be held in memory at one time.

QUILL

The best thing about *Quill* is that it is very simple to use. Otherwise I found it rather disappointing. Six lines at the top and three at the bottom of that already reduced screen are occupied by program "prompts", so you have only 16 lines to use for text. There is no windowing or split screen facility so you can only view one text at a

time, although there are various commands for making changes to texts held in memory but not on the screen.

But my main criticism is that *Quill* is very slow. If one has a part-written document saved as a disc file, this cannot be loaded direct onto the screen. Indeed, from switching on the machine, you have to:
Load MS-DOS
Change the default disc drive
Load Xchange, to give a menu
Select QUILL:NEW TASK and type in the name of the task
Press function key f3 to get the command menu
Select "Load" on the command menu (single letter 'L')
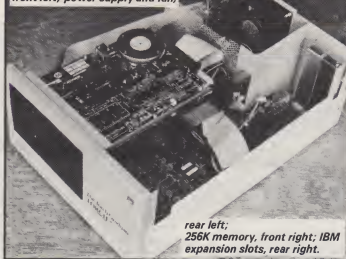And finally type in the file name and Return.
I timed this to take 1 minute 25 seconds compared with less than 30 seconds for comparable word processors but this could be speeded up by writing an MS-DOS batch file.

Cursor movement is also very slow. Using the arrow keys, with or without Shift, you can move one letter or one word in either direction and there is a "GO TO" command which takes you to the top or bottom of the text or to a specified page number. However, there are no commands to go to the start or end of a line, sentence or paragraph and the cursor on its own moves slowly and jerkily. I found that, in various situations, the screen could not keep up with even my tortoise-like typing speed, especially if I did short words on a series of new lines, like a shopping list.

However, what is lost in speed of execution is regained by reliability and ease of use. I found I made very few errors using *Quill*. Learners, or those who have found more sophisticated word processors difficult, will warm to it. It is a "wysiwyg" (what you see is what you get) word processor: that is at the top showing the 80 print positions and, at the bottom, a clear statement of which word, line, page, task and document you are on and whether you are in INSERT or OVERTYPE mode. You can set your page length and a neat dotted end-of-page line appears, so there

is no chance of printing a sub-heading and then having an embarrassing page break before the text appears. You can override the page breaks, if you want to leave space for a diagram or table, rather than begin it three quarters of the way down a page.

There is also provision for putting headers and footers (a standard line of text at the top or bottom of each printed page) and these can be at left, right or centre but there is no facility for alternating them, for documents printed on both sides of the paper. Variations in text presentation, such as double-spacing, are easy and a series of typefaces are offered: bold, underline and italic plus super- and sub-script but none of these are indicated on the screen text, so editing could be very difficult: you would not know what you had underlined. There is a full range of copying, merging, deleting, search and replace commands, all of them simple but slow. Finally there is a clever glossary facility: you can make any key on the keyboard memorize a sequence of characters or commands (up to a limit of 250 characters) which you can then call up with two key-strokes. Once again, retrieving is slow: each letter is printed out singly on the screen, at a rate of under four characters per second (much slower than a competent typist) which rather takes away the value of the facility.

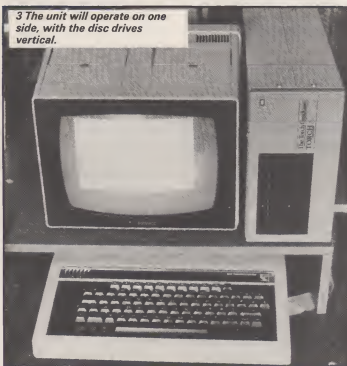*Quill* has its own "mail-merge" procedure. This can either:
Use a separate file that contains the various name, address and data lists, not unlike the MACRO facility in Acornsoft's *View*, or
Accept variable data, typed in each time at the keyboard or
Accept suitable files "exported" from the *Archive* database.

I shall not assess this in detail as I plan a complete article on mail-merging shortly.

ABACUS

As a businessman I liked *Abacus* immediately. Usually spreadsheets are rather impersonal: every entry is referred to by a row number and a column letter and I

3 The unit will operate on one side, with the disc drives vertical.

soon get confused. Friendly *Abacus* allows you to label a row or column and thereafter refer to it by its label. So a furniture manufacturer can draw a production chart, label his rows: DESKS, TABLES and CABINETS and refer to them by those names when entering data. It will also write in the result at the head of each column, normally a tedious and repetitive task that just asks the computer to take it on. Best of all, if you insert the number of desks you are going to make in January, then decide to increase it by 2% each month, entry of a simple, single formula will calculate the figures for each succeeding month.

You can refer to a cell on one spreadsheet, that is not on the screen, from another that is dependent on it. So, when working on his SALES PLAN, our master joiner can decide that the price per desk will increase by 10% in June and see the result **without** having to bring his PRODUCTION SCHEDULE back on the screen at all. Also appealing to the business man is the security arrangement: any file can be protected by a password, without which it cannot be loaded. The most intimate details of company profits could safely be held on a computer in an open office.

The *Abacus* screen can be split

costs 1984

Mar
25100

Apr
11000

Feb
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May
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8000

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Aug
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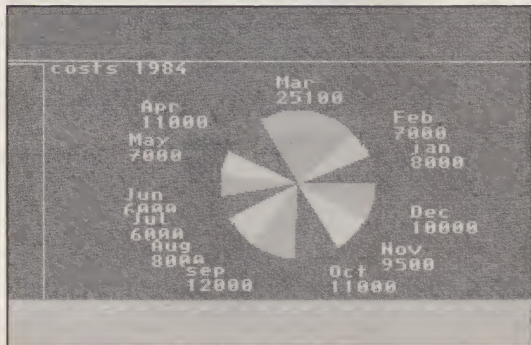
4 Quill: six lines at the top and three at the bottom of the 25-line screen are occupied by program "prompts", so you have only 16 lines to use for text.
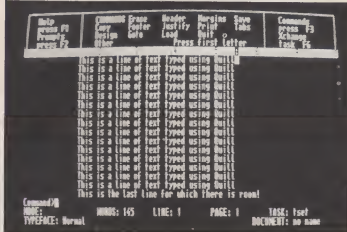
into two windows and these can be either linked to scroll together or left operating separately. There is the normal range of commands for altering the way in which data is presented: the number of decimal places, whether it is justified to the left or right of a cell, whether printing is double-spaced and so on. Also, there is a most convenient sorting procedure. Suppose the spread sheet is used to calculate the "economical order quantity" for a number of items in the furniture warehouse. Each item would take up one row which would contain a catalogue number, the item name, the supplier's name, the price and so on. Perhaps the spread sheet was drawn up in numerical order of catalogue numbers but the buyer wants to collect together the items from each supplier. Abacus will sort it by suppliers.

He then wants to arrange it in order of price, so that the senior buyer negotiates the most expensive and a junior clerk handles the cheap items. Abacus will re-order it using the price column. The only limitation concerns any part of the spreadsheet that contains formulae. This will be invalidated, so the feature has to be used with care. There is also a (much appreciated) facility to fix the vertical and horizontal titles of the spreadsheet — any of them, not just the topmost line and left-hand column.

Abacus offers a wide range of mathematics: all the common arithmetic functions, such as averages, exponentials, integers, logs, square, roots etc.: an adequate range of trig functions (although they require the angles to be presented in radians, whereas most people are used to working in
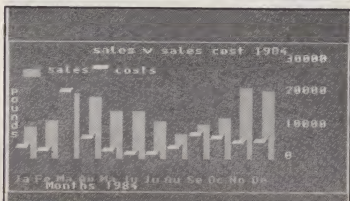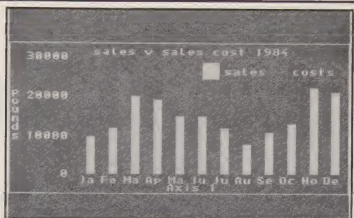
degrees; however there is a degree-to-radian conversion) and a couple of financial functions: net present value and internal rate of return. However, there is a shortage of statistical functions such as standard deviations and rather a surfeit of "computerish" ones, such as CODE, which returns the ASCII value of the first character of a word of text: of limited use to anyone outside the computer business.

ARCHIVE

Archive is a database with a programming language and reminded me strongly of DBASE II. It offers the same three basic functions:

1 Create a database "card-index" structure. Each card, called a "record", can have up to 255 fields (far more that the miserable 32 allowed by DBASE II), each of which can hold numbers or alphabetic characters and can be up to

255 characters long.
2 Create screen presentations, both for inserting and displaying or altering the information.
3 Write programs to handle the data contained in the records. For example, if one has a database of names and addresses of customers, one can write a "command program" that will select all the customers who lived in a certain town and then print address labels. With a database of employees, one can write a program to calculate wages, tax: a complete payroll program in fact.

It is in the programming language that the greatest similarity to DBASE II is evident, with "IF/ENDIF" loops, APPEND commands to add a record to a file, and ORDER (to perform the same as DBASE II's INDEX function). In addition to the language, there are


5 Easel's wide range of graphical formats.
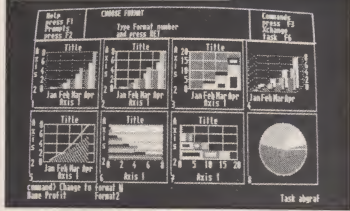
a number of programming functions, many of them the same as those used by Abacus but also some familiar to users of BASIC, such as GETKEY and INKEY. Despite being integrated with Quill word processor, Archive also provides a special program editor for compiling its programs, although one can also write Archive programs using Quill, then EXPORT them.

1 Bar charts, line curves or pie charts
2 Vertical or horizontal
3 Side by side, overlapping or stacked (one on top of the other)
4 Use of the complete range of screen colours plus shading variations
5 Graph borders of variable thickness and colour
6 40 or 80 column display and printing
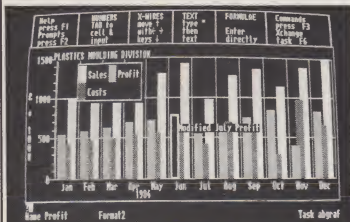
6 In a few seconds Easel changed from this vertical barchart

A word of warning however. All the other Xchange programs are characterised by simplicity and ease of use. Writing database manipulation programs, which may use any from a vocabulary of some 80 programming commands, plus a further 40 function descriptions, is neither quick nor simple. Although the handbook and tutorial program provide a certain amount of help, I was rather suprised that Archive did not come with a number of standard programs for doing simple tasks. In my experience the average user will, unless he keeps his tasks short and simple, need to spend several late evenings to produce Archive manipulation programs that do what he wants. It will be well worth it..... but warn your spouse not to stay awake waiting!

7 Text labelling plus special arrangements for graph titles and axes.

HANDBOOKS

The Xchange Software handbook would be, but for one thing, excellent. It is split into two parts: a how-to-do-it section, for the complete suite and for each member, and a reference section that lists and defines the commands for each module. Wide use is made of screen diagrams and worked examples and there is a detailed and excellent contents list at the front. Its major shortcoming is the lack of an alphabetical index. I find it extraordinary that those, who present programs of such complexity and sophistication, do not realise how handbooks are used. Some users will read logically through once only; most will not have time. Thereafter a handbook is used like a dictionary: you look up what you need. With no index this is a nightmare! I discovered, only at the very end of

EASEL

Easel is a business graphics package with a wide range of choices:
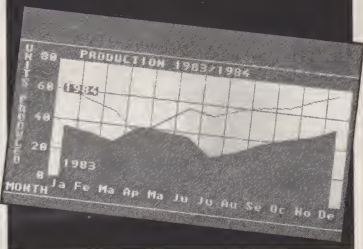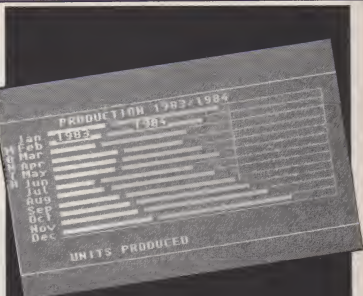
Printed on an Integrex printer, these show various graphics

produced on Easel with incredible ease!

two solid days spent exercising these programs, that it was possible to use Quill to edit the Archive programming language. This gem of information, lack of which might result in a user spending hours of work unnecessarily, is buried deep in the text. An alphabetic index in which one could look up the word

'EDITING' would have revealed this in a few seconds. From Torch, one of whose main products is Perfect Writer wordprocessor with an "indexing" facility, I find it incomprehensible! It is a great pity that superb documentation should be spoilt by this shortsighted omission of a vital feature.

ASSESSMENT

For the cost-conscious business-person, who has been using a BBC Micro and discovered that it is not nearly powerful enough, there have in the past been two choices:

1 To fit a Z80 second processor, giving access to a range of CP/M software that can run with only 64K of memory.

All the suppliers of Z80 offer bundled software but it all has limitations, mostly associated with shortage of memory.

2 To throw out his BBC micro and go to a professional business system, such as the IBM PC or Apricot XI but he will see little change out of £2000.

Graduate offers a third course and it will appeal to many: for another £1000, he gets a twin disc machine, with abundant memory, access to the whole huge range of IBM PC compatible software, and an excellent suite of integrated software which will handle his general administration needs. If he wants to expand thereafter, he can put in more memory or add an IBM-compatible hard disc costing around £1300.

I believe this is a choice many people are going to find very attractive. Despite some shortcomings, Graduate plus *Xchange* is **excellent** value.

I much preferred the 80-column graphs. The key box occupied less space: in 40 column it seemed to obscure quite a lot of important data. (One would pay the penalty by loss of colour of course.) Graphs can be marked with symbols, which in turn can vary in colour and shading and line graphs can vary in thickness. Bar charts can be created with isometric (three dimensional) perspective and pie charts can have one segment removed sideways to focus attention. As well as using the wide calculating powers of *Abacus*, *Easel* has its own formulae, although these are rather more limited.

I found *Easel* brilliant: incredibly flexible and extremely easy to use. There is no fiddling about trying to work out the best axes scales: that is all done for you. The speed, with

which one can alter the presentation of data to display it to best advantage is breathtaking. The photographs show identical data, altered within seconds from vertical, three dimentional bar charts to horizontal bar chart and to pie chart.

INTEGRATION WITHIN XCHANGE

Thus far the *Xchange* programs are conventional. It is in its ability to swap data from the one to the other that the true power of the *Xchange* Suite becomes apparent. You can extract information from the data-base and feed it into word-processed text or into a spreadsheet table; you can represent tabular spreadsheets in graphical form; you can incorporate tables within text reports.

This transfer of data can be carried out in two ways: either you can create an intermediate data file or transfer directly. Data transfer files are nothing new. Innumerable people have used *Multiplan* data in a *Wordstar* report for example. *Xchange* scores because all the formats and codings used are compatible. Each program has an EXPORT command, to specify which data is to be transferred and an IMPORT command, to denote which file is to be received and where it is to be put.

Switching data between the modules is extremely easy. It took me a few seconds to export the contents of a spreadsheet budget to *Easel* and have it turned into lucid, helpful graphs. It was equally easy to transfer the same data into the body of a *Quill* report but, to my great disappointment, you cannot export *Easel* graphics straight into *Quill*. If you want to incorporate graphs in your report, you would have to print them out separately and modify page numberings accordingly.

Abacus has joined the big league, of sexy, integrated software suites such as *Symphony* and *Lotus*, because it can transfer data *without* creating intermediate files. It is this ability which justifies

integration of all four programs within a single shell, the cause of my earlier complaints about slowness and the tedious loading sequence. The process of transfer is intricate and users would need to

gain experience but an excellent tutorial disc is very helpful. In painless, easy-to-run lessons it leads, step-by-step, through the IMPORTING and EXPORTING processes.
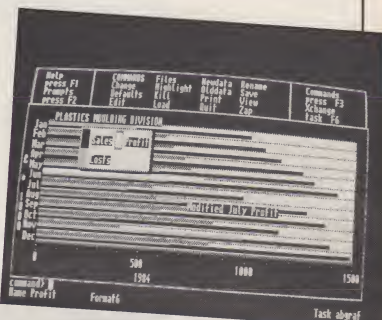
7 to this horizontal chart and
8 this pie chart